Exhibit B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent in Reexamination

7,509,178 — Atty. Ref.: 8157.029.178

Control No. 95/001,295 — TC/A.U. 3992
Filed: January 14, 2010

Examiner: FERRIS III, FRED O.

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MAIL STOP *INTER PARTES* REEXAM

ATTN: Central Reexamination Unit
(CRU) Director
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Expert Declaration of Dr. Kevin C. Almeroth

I, Kevin C. Almeroth, declare and state:

1. I am a Professor of Computer Science at the University of California in Santa Barbara where my main research interests include computer networks and protocols, wireless networking, multicast communication, large-scale multimedia systems and mobile applications. I received my B.S. (1992), M.S. (1994) and Ph.D. (1997) degrees in Computer Science from the Georgia Institute of Technology. My credentials are attached.

2. I have been retained by Nixon & Vanderhye PC at the rate of $500 per hour to review the papers in the reexamination proceedings of U.S. Patent No. 7,509,178 (the '178 Patent) and formulate my opinions. I have been instructed concerning and/or reviewed 35 USC 102 & 103; *Graham v. John Deere Co.*, 383 U.S. 1 (1966); *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007); and certain model jury instruction excerpts concerning obviousness. I have also reviewed the Reexamination Request, the Patent Office's 4/16/10 Office Action, and each of the items cited therein. I respectfully offer my opinions below for the patent examiner's consideration.

3. In my opinion, a person of ordinary skill in the art to which the '178 Patent pertains in 1996 would have had the equivalent of a four-year degree from an accredited institution (usually denoted as a B.S. degree) in either computer science or computer engineering with a concentration of courses in programming and the development and use of hardware and software, and approximately two to three years of programming experience. Additional graduate education might substitute for experience, while significant experience in the field of computer programming might substitute for formal education.

State-of-the-Art in the Mid-1990s

4. In the mid-1990s, use of computer networks, like the Internet, for delivery of multimedia files was in its infancy. The well known content delivery companies of today, for example Apple, Real Networks, and Yahoo either had not yet begun to focus on content delivery or were just getting started. Apple was still focused on competing with Microsoft in the PC market—and not doing well. Real Networks had only recently changed its name from Progressive Networks and barely had a rudimentary ability to listen to songs sent over the Internet. Yahoo was still focused on search and had not yet bought Mark Cuban's broadcast.com—a company that had only been founded in September 1995 as "AudioNet".

5. In those early years, downloading was dismissed as a technique for delivering multimedia content. The content files were still quite large, especially for any decent level of quality; computer networks, especially the "last mile" for users were quite slow and downloading content took too long (on the order of many minutes to download a single song) to create a compelling user experience; and there was limited storage on users' PCs—disk sizes were measured in hundreds of megabytes as compared to today's PCs which have 1,000 times more capacity.

6. The a direction of interest was on "streaming" multimedia, continuously delivering a small amount of data to the user with the hope that the network would be able to deliver enough data per second that the user would receive enough data to maintain a continuous playout of content. At the technical level, problems addressed included achieving better levels of compression without loss of quality, improving the capacity of networks, improving the capability of networks so that they prioritize streamed data, and improving the responsiveness of PCs in order to avoid playout interruptions.

Opinions Concerning the DAD Manual

7. The Digital Audio Delivery (DAD) Manual is an "Operations Manual" that explains how to use the DAD System. As is detailed below, the DAD Manual is missing features for what the Requester alleges is the claimed combination.

8. The DAD Manual describes a system to be used by "operators". The DAD Manual discloses a specialized system designed specifically for use by radio and television broadcasters to create program content to be broadcast to listener's conventional receivers (see, e.g., pages xvi, 2-7). I note that the company that authored the DAD Manual, ENCO, was focused on "providing computer based process control in industrial applications" and "television and radio broadcasters" (http://www.enco.com/). Requester uses the terms "user" of the DAD System and a "listener" interchangeably. However, there is a difference between a user of DAD, properly called an "operator", and an end listener of music. The DAD Manual describes a system designed to be used by radio producers to design audio programs for playout over traditional broadcast radio. Numerous architectural, user interface, and other features flow from DAD's specialized radio broadcast design. The described DAD system offers a fundamentally different service, provides features motivated from a different set of operator needs, and resulted in capabilities that were different than those described in the '178 Patent. For example, DAD provides the broadcaster with an elaborate interface to create programming content that is broadcast to listeners. No control is given to the eventual listeners over what that content is or when it is listened to.

9. The technical incompatibility between the system the DAD Manual describes and personal players intended to be controlled by end listeners becomes even more apparent when Requester tries to combine the DAD manual with references like Sony consumer products, Loeb, Peterson, Foladare, and/or Schulhof (see below). First, those systems are focused on delivering content to one or more individual listeners, content tailored specifically for individual listener tastes and preferences. It makes no sense whatsoever to develop a playlist in DAD based on operator profiles (i.e., the true user of DAD) when the DAD playlist is being developed for use by radio broadcasters not individual listeners and when the DAD has zero ability to access or incorporate individual listener information into a single playlist meant for many. Given that DAD was specially designed and structured for television and radio broadcasters, there existed neither the motivation to combine one or more individual, listener-focused references nor the necessary parts of the DAD system to provide solutions to the following problems: (1) identify listeners of a traditional radio broadcast, (2) collect individual listener preference information, and (3) use the information from these individuals to create a playlist that would be satisfying to all members of a future audience—an audience whose members will not be known when the playlist is developed.

10. Further, the DAD Manual describes a system that was specifically designed to be used by television and radio broadcasters with the goal of being intuitive, easy-to-use, and specially tailored:

> "The building block for a DAD system is the DAD486x workstation. This unit has been specifically designed to meet the operational needs of both live broadcast and studio production. It combines high quality I random access audio in a compact, self contained package with an extremely friendly control interface. The operator is able to perform standard record and playback functions with little or no training, while editing and many other powerful production features become routine after just a few hands-on sessions." (Pg. xvi).

11. The DAD Manual would have disclosed to someone of ordinary skill in the art that, when the DAD workstation was configured to operate on a network, it would have accessed its audio files and playlists directly from a centralized library on the file server, and played back audio cuts directly from a file server rather than downloading plural audio files for persistent storage onto its own local hard drive (see, e.g., xvii, 12-2). DAD standalone workstations, on the other hand, do not have access to and therefore do not download any files over a network from a file server. When the DAD Manual describes the networked workstation as using "the Library location data to find the audio cuts in the file server" [8-23], it is not downloading and persistently storing a plurality of audio files on its local hard drive. Rather, one skilled in the art would have understood this disclosure as streaming audio data stored on the file server a bit at a time without downloading and persistently storing a plurality of audio files in local storage.

12. The DAD Manual's "Playback Lookahead" mode copies audio cuts from a network server when requested and deletes them once played (see, e.g., 12-9). The DAD Manual states that even when "Playback Lookahead" is turned on, once played "The local cut is then discarded." [12-9] One skilled in the art would have understood from the DAD Manual that to the extent any part of such audio files are stored on networked workstations that access the server, the files are stored only non-persistently, played, and then immediately discarded. One skilled in the art would have understood that this section of the DAD Manual does not disclose any downloading of a plurality of audio files and a sequencing file for persistent storage on a local storage unit of the player.

13. The Examiner relies on a DAD "import" function for copying a so-called "play list." However, the source data accessed by the DAD "import" function is not of the "play list" itself, but rather what the DAD Manual refers to as "source data files" from which the DAD system can (e.g, after manual editing) eventually generate a "play list". Many facilities were using music and traffic scheduling systems to generate their daily play logs. The DAD Manual states that in most cases these systems created data files that could be read and translated into DAD playlists using the IMPORT feature of the PLAY LIST screen. Typical sources for these files include popular systems such as Selector, Power Play and CBSI (see, e.g., 7-19). The DAD Manual explains how these and other file formats (e.g., ASCII, text files, Excel, Lotus 123, etc.) could provide "source data" from which the DAD system could "create play lists" [7-19; 7-20].

14. From the DAD Manual, one skilled in the art would have understood that "source data files" first had to be imported into the DAD software and then further manually processed to create a DAD playlist. These "source data files" are not themselves DAD playlists and the operator would use manual operations such as SCAN and EDIT (see, e.g., 7-12) before DAD could generate an operable DAD playlist

15. Thus, any such "source data files" being imported were not themselves capable of performing the operations of controlling "a processor for continuously delivering a succession of said audio program files in said collection to said audio output unit in said ordered sequence specified by said sequencing file."

16. DAD's IMPORT function did not "import" files via a communications link from a server computer. Instead, it "imported" locally stored files that had "been created outside the DAD486x program into DAD" but which already resided on the DAD workstation drive. [5-18] The "import" capability thus imports locally stored files, and the DAD

Manual recommends that "Most playlist and report file transfers involving non-DAD workstations can be accommodated by carrying a floppy diskette from one workstation to another." [DAD Man. 12-8] It is clear that the optional IMPORT program does not download any sequencing file of the type claimed in the '178 Patent via a communication link from a server computer (see, e.g., 7-20).

17. The DAD Manual, in a special section on "External Automation with the DAD486x", describes how, "An equally powerful set of features is optionally available to enable the DAD486x to work with external automation equipment, allowing fully integrated operation in any facility or application." [10-2] It is in this section that Requester and Examiner identify a "Download Playlist" function (see, e.g., 10-4). However, in the context of Section 10.0 and with the emphatic note: "FOR SERIAL USE ONLY" [10-4], the DAD Manual does not disclose the limitation of "a communications port for establishing a data communications link for downloading a plurality of separate digital compressed audio program files and a separate sequencing file form one or more server computers."

18. One skilled in the art would have understood from the DAD Manual that the "Download Playlist" function *only* works in Serial Mode, that Serial Mode is only available between the DAD486x workstation and attached external automation equipment, and that the DAD486x is prohibited from operating in the configuration where there is a server. Therefore, there is no teaching that playlists stored at a server are downloaded to the DAD486x workstation. In fact, the prohibition from operating in this configuration teaches away from the claimed limitation.

19. The use of Serial Mode and the automated control of external equipment is consistent with the purpose of DAD and fundamentally different than the '178 Patent. As described in the DAD Manual, an example of a kind of external device is a "Pioneer CAC-V3200"[1] [10-17], a professional grade 300 CD jukebox. As the DAD Manual describes to one skilled in the art, this device can be controlled by the DAD486x workstation (but only in standalone mode). The idea of using the DAD486x workstation to fully control an external device, which is then used to generate audio output that is fed into a radio broadcast system, is fundamentally different than the invention of the '178 Patent.

Sound Blaster + Windows 95 Resource Kit

20. Requester contends:

> The Sound Blaster User's Guide discloses the use of playlists to play audio in a desired order. It additionally discloses the use of standard controls that emulate what users would have been familiar with based on known portable audio players (e.g., CD players) and the like. The Sound Blaster User's Guide specifically discloses features and operations to be used in conjunction with a Windows 95 based system. It would have been obvious to one skilled in the art to combine the teachings of the Sound Blaster User's Guide with the well known file server capabilities associated with Windows 95, namely, for example, the ability to store files and data on a file server as opposed to on the local system. In this manner it would have been obvious to download audio segments and related information from a file server to the local Sound Blaster audio system.

21. The Sound Blaster Manual describes software designed for use with Windows 95. The Windows 95 Resource Kit clearly states that when a system is remote mounted, the information is only cached. The "VCACHE" mode of Windows 95 is where "[F]iles read across the network are copied to the RAM cache and made available to applications..." (250-252). However, RAM caching is not storing into local persistent storage. Once the personal computer is turned off, the data disappears. Thus, like the DAD Manual operating in networked mode, one skilled in the art would have understood that the combination of Sound Blaster and Windows 95 would not persistently store a plurality of downloaded compressed audio files and a downloaded sequencing file on local persistent storage.

22. One skilled in the art would have understood that the Sound Blaster software running on a personal computer could access local files or networked files but had no teaching to first download networked files to persistent storage within the player and then use such persistently stored files for playback etc. The Sound Blaster

[1] Information on the Pioneer CAV-V3200, as an example of the kind of device that can be automatically controlled by a DAD486x workstation is available at: http://www.pioneerelectronics.com/pio/pe/images/portal/cit_3424/27409207CACV3200info.pdf

Manual + Windows 95 thus does not disclose or suggest providing a sequencing file that can be downloaded onto local persistent storage of the player to reference locally stored audio files as these documents would have been interpreted by someone of ordinary skill in the art.

23. Further, the Sound Blaster Manual + Windows 95 is exactly the kind of system distinguished in the '178 Patent as needing to be improved upon [1:56-2:2]. Given the hardware limitations of the mid-1990s, as described above, it would not have made sense to store a library of audio songs locally. Typical storage requirements for a reasonable sized library would be far greater than what was commonly available on a personal computer. Such a fact would teach away from storing audio files locally, and instead, it would have made more sense to store the files only on the designated remote server, as is explicitly taught in the Windows 95 Resource Kit.

DAD Manual + Sony Discman or Sony Minidisc Recorder

24. Requester contends

> The DAD playback controls were "borrowed" from standalone analog audio cartridge tape playback machines: "The main playback machines provided by the DAD486x are very similar to most existing analog cart machines. The buttons provide all normal control functions; however, a number of additional features, not possible with tape based systems, are available with the DAD4B6x." PA-A (DAD Manual), at 5-4. Providing controls already familiar to the user was the motivation: "The system provides the user with standard record and playback functions, using a familiar push button based control panel." PA-A (DAD Manual), at xvii (emphasis added). Like the DAD Manual, the Sound Blaster User's Guide also depicts playback controls "borrowed" from a standalone audio playback device. PA-F (Sound Blaster User's Guide) at 1-7. These examples show that there was an established practice of designing playback controls in audio software based on playback controls from standalone audio devices, such as the Sony Discman, that new users of the software would likely find familiar.
>
> Choosing a specific standalone audio device upon which to base a software design was a matter of engineering routine. It would have been obvious to one of ordinary skill in the art that the playback controls of a Sony Discman player could be emulated in the DAD software.

25. Combining DAD and the Sony consumer electronics devices does not make sense; there is neither any motivation to combine the two references nor would it have been technically feasible. The intended use of DAD as compared to either the Sony Discman or the Sony Minidisc Recorder is far different. The Requester tries to create a relationship between these references by conflating the intended users of each system and over-simplifying the different intended purposes of each. DAD is specially designed for operators of television and radio broadcasters. It is clear that the two Sony devices are consumer electronics devices intended for individual listeners. These two classes of users are separate and distinct and there exists no motivation or to combine the different references. One skilled in the art would not have simply imported any function from a system intended for one group of users and provide it to such a different second group. In line with this analysis, no real reason or justification was made by the Requester why a user of DAD would need a double-tap-repeat in building radio playlists. The intended use of the DAD was to build playlists that would be used to create a music session broadcast over traditional radio airwaves: "This unit has been specifically designed to meet the operational needs of both live broadcast and studio production. It combines high quality random access audio in a compact, self contained package with an extremely friendly control interface. The operator is able to perform standard record and playback functions with little or no training, while editing and many other powerful production features become routine after just a few hands-on sessions." [xvi] A simple rewind function to move between tracks as part of the radio playlist editing process would have been sufficient and was the express purpose for which the DAD was designed: "[an] intuitive graphic interface featuring a touch screen emulating the control features of familiar broadcast hardware maximizing operator acceptance." [xvi]

26. In addition, the use of the Sony Discman depends on "tracks" defined by an optical disk. The Sony Minidisc Recorder similarly uses "tracks" but defined by a magnetic-optical disk. In allowing the listener to specify a sequence for playing these "tracks", there is no teaching or suggestion as to how such controls could be made to operate with separate audio files, nor is there any suggestion of using such controls with a downloaded sequencing file as claimed. Requester emphasizes the mere fact that the pieces of art belong to the same extremely broad subject matter area: "These examples show that there was an established practice of designing playback controls in audio software based on playback controls from standalone audio devices, such as the Sony Discman, that new users of

the software would likely find familiar." [Re-Exam Request, 79 and 94.) This instance is an example when Requestor merges two different user populations, the broadcast radio operators and consumer device users, in an attempt to justify combining references for which there is no rationale justification to combine. DAD is not in the class of devices intended for individual listeners. Further, the discussion of Dad's intended uses and users (see, e.g., xvii-xviii) teaches away from adding any additional functionality, especially functionality not specifically intended for radio broadcasters.

DAD Manual + Loeb

27. Requester contends:

> The DAD Manual discloses the ability of a listener to build a music playlist by selecting audio cuts from a library. PA-A (DAD Manual), at 3-9 ("The left side of the screen is a Library display, which allows you to search for and display cuts in the audio library. The right side of the screen is where you will build your playlist."). One skilled in the art presented with this disclosure in the DAD Manual would be motivated to increase the power of this interface by expanding the ways in which the user can use the power of the computer to select audio cuts. The Loeb article discloses a manner by which audio tracks may be selected based on a user profile and/or on the user's opinions of previously played audio. PA-E (Loeb article), at 45 ("the LyricTime prototype selects songs from a database and plays them for the listener. More specifically, to select songs from the database, it uses the information filter which implements the model described in the previous section, using descriptions of the songs, a listener profile, and feedback from the listener. The listener can step through the selected songs, look at title and artist information, or have the LyricTime prototype play them. The listener profile provides listener specific preference information to the filter. Listeners can have different profiles for different moods. Listener feedback is used to update the profile based on the listener's opinion of songs that have been played."). Thus, one skilled in the art would be motivated to combine the teachings of the DAD Manual and the Loeb article to implement a more powerful interface for selecting audio cuts to build a playlist.

28. Requester tries to combine the DAD Manual with Loeb because Loeb describes delivering content to an end listener. Note again how Requester incorrectly attempts to characterize the user of DAD as the ultimate listener of the content. As described above, this is completely incorrect and the DAD Manual teaches only a system for radio broadcasters and away from a system designed for listeners. Therefore, it makes no sense whatsoever to develop a playlist in DAD based on listener profiles when the DAD neither teaches nor has any ability to access or incorporate listener information into the system. Given that DAD was designed for television and radio broadcasters, there is absolutely no motivation or technical way for a person of ordinary skill in the art to combine the two wholly incompatible systems.

29. The DAD Manual describes, to one skilled in the art, a "closed" system in which, even in the instance when multiple operators are supported, they are all in the same "facility" and part of a single system: "DAD has been developed using a modular approach which enables a complete system to range anywhere from a single stand alone workstation with a single channel of record/playback capability to a facility wide, multi-user, multi-channel per user audio network." [xvi] In such a system, the servers and workstations are owned by the operator, the audio content on those servers is all owned (licensed) by the operator, the network is part of the facility—all of the parts of the system are under the control of the operator. Whereas, Loeb uses a fundamentally different system, offering a fundamentally different service to a fundamentally different group of users. Loeb describes a system with "information sources", "third parties" that exist between the information sources, and the "individual users." Loeb describes a way for individual users to tailor the content that they receive, the mirror opposite of what a radio broadcaster does.

30. For example, Claim 10 of the '178 patent requires selecting from a "catalog listing of recommended audio program files" which in turn are "selected in accordance with program preference data or program selections previously accepted from said listener." Requester relies on Loeb for this teaching, alleging that one skilled in the art would "increase the power" of the DAD interface by "expanding the ways in which the user can use the power of the computer to select audio cuts." However, the DAD Manual describes developing a playlist for a radio broadcasting system that is used to broadcast program material to potentially thousands of listeners over the airwaves. It would make no sense to modify DAD to include Claim 10's catalog listing and program preference data selection from thousands of users in such a radio broadcasting system. Further, there are no technical details of how such a

system, even if reasonable, would be constructed, how the data would be collected from users, how it would be stored, or how the DAD operator would use that data to his or her advantage in improving the satisfaction of an unknown group of listeners when the content was played over the radio airwaves.

31. Similarly, there is no teaching to operate Loeb's filtering on server files as Claim 11 requires. Claim 11 relates to the audio program player (which Requestor argues is the DAD audio player used by the broadcast radio operator) and transmitting audio files to the player based on requests received by listeners. This is yet another instance where conflating the users of different systems results in an illogical and infeasible system. An individual listener would simply have no access to the "communication link" connecting the DAD audio player to its respective server—both of which are described as located in the radio broadcaster's facility. The clear distinctions between the systems that DAD and Loeb are describing would prevent a person of ordinary skill in the art from attempting or even contemplating the combination of the DAD Manual + Loeb.

32. As described above, in the mid 1990s, it made sense to stream (a) when there was network connectivity, (b) when files were large but could be delivered by sending smaller amounts of data spread over the duration of the multimedia content to be played, and (c) when the network could keep up with the transmission. It made sense to download when a user wanted full control over content, but given the limited amount of local storage, downloading for large sized objects was generally discouraged (and so only stored centrally). As the Loeb article discusses, the goal was to limit what content was stored local to each individual user by filtering what was transmitted and personalizing it. This is yet another example of where Requester's over-simplification of the state of the art into only streaming versus downloading ignores the wide spectrum of subtle but fundamental distinctions in what could be offered to a user. One teaching of the Loeb article is the subtly and power of these distinctions and the need to continue to explore their intricacies:

> "The complete landscape of filtering applications and usage scenarios is yet to be explored. However, at this point we can identify a subset of 11 dimensions that define it. These dimensions, which will be described, entail aspects of the architecture and the dynamics of the complete end-to end personalized delivery system when deployed in the real world. The information-filtering model appropriate for each individual realizable point in this multidimensional space may be different, enabling it to accommodate different end-to-end application needs. We believe it is important to present these dimensions here to provide the context for the new filtering model and application, which are presented later." (Pg 2, Col. 3)

33. What Loeb is proposing that should be explored as future work is yet another kind of system that has a distinct personalization capability separate from the information source, something that could be located at the user or at a third party. This system would not meld well with any of the other systems applied in the rejections.

DAD Manual + Peterson

34. Requester contends:

> The DAD Manual specifically contemplates the idea of charging for audio cuts that are selected and played: "With the proper options, you can generate an 'as played' report for the billing department." PA-A (DAD Manual), at 5-4. One skilled in the art would have been motivated to provide for the use of common credit cards for billing rather than mailed paper bills. Peterson describes such a credit card system for use with audio delivery.

35. Requester tries to combine the DAD Manual with Peterson because, "one skilled in the art would have been motivated to provide for the use of common credit cards for billing rather than mailed paper bills." Requester, however, does not provide any citations from the DAD manual that references credit cards. No such reference exists and it makes no sense whatsoever to incorporate credit cards or payments into DAD.

36. As with DAD and other references described above, Requester conflates the radio broadcasters of DAD with the end users of Peterson. Such an over-simplification leads to fundamental incompatibilities between the two systems.

37. Requester proposes to invalidate only Claim 12 using the DAD Manual + Peterson. Claim 12 recites additional features of establishing a subscription account for a listener, the account information including a unique identification of a listener, and credit card information for use in billing charges to the listener, wherein some of the downloaded separate digital compressed audio files are purchased by the listener.

38. The listeners who use Peterson's music CD creation kiosk to buy personalized music (see, e.g., Abstract) are fundamentally different than the radio broadcasters that use DAD to prepare playlists for on-air transmission. Further, the systems themselves have no similarity—a fact Requester fails to address.

39. With regard to the one function used in Peterson, that of credit card processing, there is no need whatsoever for a credit processing facility in DAD. As the only justification, Requester cites to DAD's logon capability, a capability used only for security in DAD, not for any kind of billing: "The DAD486x Security System provides .security not only to the system itself, but to its operators as well. A properly configured Security System greatly reduces the chances of operator error, like accidental deletions or incorrect switch settings, making it a valuable tool to help operators develop confidence and efficiency of operation." [9-2] As such, there is no reason whatsoever for credit cards in DAD. The DAD Manual describes in detail the specific purpose of the logon facility, thereby teaching away from combining DAD with any kind of individual listener credit card processing facility.

DAD Manual + Peterson + Loeb

40. Requester contends:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of the Loeb article, and with those of Peterson. All three relate to the distribution of digital audio selected by the user from a computerized library of audio selections.

41. All of the reasons listed above for why the DAD Manual + Loeb and the DAD Manual + Peterson would not have been obvious, desirable, or feasible apply to the combination of the DAD Manual + Peterson + Loeb. Further adding to all of these reasons is the simple fact that combining three references would have been less obvious, less desirable, and less feasible than the reasons described above.

42. Requester's attempt to create a connection between the references by claiming a relationship that exists only under the broadest possible criteria, results in no substantive relationship among the references. Distributing digital audio (all audio stored in a computerized library is digital) from a computerized library encompasses every possible type of transmission, every possible way in how and on what kind of system audio is stored, and every possible way in which audio is received, processed, and played. References meeting these criteria have no meaningful relationship, as was evidenced above in attempting to combine only two of these references. Further, here again, Requester conflates the term "user" to the point that there are no definable characteristics for such a user—it can be anyone, including as described above, from a radio broadcaster to a PC user to a Discman user.

DAD Manual + Peterson + Loeb + Schulhof

43. Requester contends:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of the Loeb article, and with Peterson. All four describe systems for the distribution of digital audio selected by the user from a computerized library of audio selections.
>
> Schulhof also discloses a system for selecting and accessing digital audio from a computerized library: "The invention relates to the distribution of subscription and on-demand audio program material." PA-G (Schulhof), col. 1, ll. 8-9; col. 5, ll. 60-67 ("The invention allows a subscriber to: (1) select audio program material from a remotely located library; (2) when he wishes to make the selection; (3) receive the material via a variety of communications means at a rate much faster than real time, such that it is not necessary to wait very long to receive the program material; and (4) transport the stored program material to a vehicle or other location for playback in a suitable mechanism; (5) at any desired time."). Accordingly, persons of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual the Loeb article, Foladare, and Peterson with those of Schulhof.

44. All of the reasons listed above for why the DAD Manual + Loeb, the DAD Manual + Peterson, and the DAD Manual + Peterson + Loeb would not have been obvious, desirable, or feasible apply to the combination of the DAD

Manual + Peterson + Loeb + Schulhof. Further adding to all of these reasons is the simple fact that combining four references would have been less obvious, less desirable, and less feasible than the reasons described above.

45. See also Paragraph 42 above, which explains why the Requester has failed to identify—because there does not exist—an appreciable relationship among any of these references. Requester tries to provide an additional motivation to combine for DAD + Schulhof. This motivation ignores the role of Peterson and Loeb and ignores the fundamental difference between DAD as a system for radio broadcasters and Schulhof as an "invention [that] relates to the distribution of subscription and on-demand audio program material." [1:8-9]

46. Requester tries to utilize the feature of Schulhof which Requester describes as "audio is encrypted prior to delivery to the listener device and then decrypted upon receipt by the listener device for subsequent playback." [Re-Exam Request, Pg. 121] If the "listener" identified by Requester is the DAD radio broadcaster, there is no need for such a capability since, as the DAD manual discloses, the system is used within a facility and system components are connected by single cables (see, e.g., xvi-xvii). If the "listener" identified by Requester is the individual user listening to a traditional on-air radio broadcast produced as a result of using DAD, then certainly a traditional radio receiver would not have decryption capability. Further, there would be no reason to encrypt a radio transmission broadcast over the open airways and intended for anyone within range to receive it. Adding such a capability would only serve to increase complexity and cost with absolutely zero benefit.

47. The result from attempting to combine features and integrate systems across such a disparate set of systems would be overly-complex at best and more likely nonsensical and non-functional. Even if the task were undertaken to attempt to build such a system, the result would be of no use to anyone.

DAD Manual + Peterson + Foladare

48. Requester contends:

> The DAD Manual specifically contemplates the idea of charging for audio cuts that are selected and played: "With the proper options, you can generate an 'as played' report for the billing department." PA-A (DAD Manual), at 5-4. One skilled in the art would have been motivated to provide for the use of common credit cards for billing rather than mailed paper bills. Peterson describes such a credit card system for use with audio delivery.
>
> Foladare teaches a manner whereby a listener can establish and use a subscription account to access and select and access audio programs from a library over a network. In view of these teachings, one skilled in the art would have been motivated to combine the teachings of the DAD Manual, Peterson, and Foladare to form a system by which a user could select audio programs for a playlist through use of a subscription account and then pay for selected audio programs using a credit card.

49. All of the reasons listed above for why the DAD Manual + Peterson and below for the DAD Manual + Foladare would not have been obvious, desirable, or feasible apply to the combination of the DAD Manual + Peterson + Foladare. Further adding to all of these reasons is the simple fact that combining four references would have been less obvious, less desirable, and less feasible than the reasons described above.

50. See also Paragraph 35 above, which explains why the Requester has failed to identify—because there does not exist—an appreciable relationship among any of these references.

51. See also Paragraphs 34-39 above for why the combination of the DAD Manual + Peterson is illogical and infeasible.

52. Requester adds Foladare for the purpose of attempting to incorporate a "digital radio that can have an alphanumeric keypad." [Re-Exam Request, 123] The addition of Foladare to meet the limitations of Claim 12 (one or more manual controls includes a keyboard for accepting accounting information from said listener that is transmitted via said communications link to said one or more server computers to establish a subscription account for said listener) makes no sense. There is no listener in DAD, only an operator. Operators neither require subscriptions nor the use of credit cards. The audio player operating on the DAD486x workstation is not accessible by a listener and does not have any capability to provide user subscription information to a server.

53. The result from attempting to combine features and integrate systems across such a disparate set of systems would be overly-complex at best and more likely nonsensical and non-functional. Even if the task were undertaken to attempt to build such a system, the result would be of no use to anyone.

DAD Manual + Peterson + Foladare + Loeb

54. Requester contends:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of the Loeb article, with the Loeb Article, with Foladare, and with Peterson. All four describe systems for the distribution of digital audio selected by the user from a computerized library of audio selections.

55. All of the reasons listed above for why the DAD Manual + Peterson, DAD Manual + Peterson + Foladare, and below for the DAD Manual + Foladare would not have been obvious, desirable, or feasible apply to the combination of the DAD Manual + Peterson + Foladare + Loeb. Further adding to all of these reasons is the simple fact that combining four references would have been less obvious, less desirable, and less feasible than the reasons described above.

56. Simply put, all of the systems are incompatible, from Foladare's radio subscription service to DAD's disk jockey-based programming system to Peterson's CD burning and credit card charging kiosk to Loeb's mood-based filtering system.

DAD Manual + Loeb + Schulhof

57. Requester contends:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of the Loeb article, with Schulhof. All four describe systems for the distribution of digital audio selected by the user from a computerized library of audio selections.

58. All of the reasons listed above for why the DAD Manual + Loeb would not have been obvious, desirable, or feasible apply to the combination of the DAD Manual + Loeb + Schulhof. Further adding to all of these reasons is the simple fact that combining four references would have been less obvious, less desirable, and less feasible than the reasons described above.

59. Requester proposes to invalidate only Claim 25 using the DAD Manual + Loeb + Schulhof. Claim 25 recites the additional feature of "episodes in a series of related episodes which are requested as a group by said listener and are thereafter automatically downloaded to said player as said episodes become available for download".

60. Requester uses Schulhof's audio subscription service for listeners to "request materials on a one-time basis ... or he may want to receive information on a daily or other periodic basis, which ... is referred to as an audio subscription." [8:6-11]. This type of service and the DAD system are fundamentally different. As described above, DAD allows radio broadcasters to prepare playlists for on-air transmission. There are no individual listeners, service subscriptions, on-demand requests, periodic retrieval of content in traditional radio broadcasting, the specific environment for which DAD was developed. The DAD System can support, at most, a few radio broadcasters, not a multitude of listeners expecting delivery of subscription content. Further, each playlist developed in DAD is for the express purpose of playing audio over the airwaves, not for providing a playlist per request per subscriber. Claim 25 recites the additional feature of "episodes in a series of related episodes which are requested as a group by said listener and are thereafter automatically downloaded to said player as said episodes become available for download". DAD's on-air radio station automation system is incompatible with Schulhof's cable television distribution system. As such, there would have been no reasonable way to automatically download episodes from the DAD System to listeners.

61. The result from attempting to combine features and integrate systems across such a disparate set of systems would be overly-complex at best and more likely nonsensical and non-functional. Even if the task were undertaken to attempt to build such a system, the result would be of no use to anyone.

DAD Manual + Peterson + Foladare + Loeb + Schulhof

62. Requester contends:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of the Loeb article, with Foladare, and with Peterson. All four describe systems for the distribution of digital audio selected by the user from a computerized library of audio selections.
>
> Schulhof also discloses a system for selecting and accessing digital audio from a computerized library: "The invention relates to the distribution of subscription and on-demand audio program material." PA-G (Schulhof), col. 1, ll. 8-9; col. 5, ll. 60-67 ("The invention allows a subscriber to: (1) select audio program material from a remotely located library; (2) when he wishes to make the selection; (3) receive the material via a variety of communications means at a rate much faster than real time, such that it is not necessary to wait very long to receive the program material; and (4) transport the stored program material to a vehicle or other location for playback in a suitable mechanism; (5) at any desired time."). Accordingly, persons of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual the Loeb article, Foladare, and Peterson with those of Schulhof.

63. All of the reasons listed above for why the DAD Manual + Peterson, DAD Manual + Loeb, DAD Manual + Peterson + Loeb, DAD Manual + Peterson + Loeb + Schulhof, DAD Manual + Peterson + Foladare, and the DAD Manual + Peterson + Foladare + Loeb would not have been obvious, desirable, or feasible apply to the combination of the DAD Manual + Peterson + Foladare + Loeb + Schulhof. Further adding to all of these reasons is the simple fact that combining five references would have been less obvious, less desirable, and less feasible than the reasons described above.

DAD Manual + Foladare

64. Requester asserts:

> A person of ordinary skill in the art would have been motivated to combine the teachings of the DAD Manual with those of Foladare. Both describe systems for the distribution of digital audio selected by the user from a computerized library of audio selections.

65. Requester's attempt to create a connection between the DAD Manual and Foladare by claiming a relationship that exists only under the broadest possible criteria, results in no substantive relationship among the references. Distributing digital audio (all audio stored in a computerized library is digital) from a computerized library encompasses every possible type of transmission, every possible way in how and on what kind of system audio is stored, and every possible way in which audio is received, processed, and played. References meeting these criteria have no meaningful relationship, as was evidenced above in attempting to combine only two of these references. Further, here again, Requester conflates the term "user" to the point that there are no definable characteristics for such a user—it can be anyone, including as described above, from a radio broadcaster to a PC user to an on-demand radio subscription user.

66. Requester tries to combine the DAD Manual with Foladare because Foladare discloses a telecommunications device with an "interactive interface [that] is preferably a graphical user interface such as an Internet World Wide Web page." [4:10-15] Such an interface is in direct conflict with the express teachings of DAD which describe an interface specially designed for professional radio broadcasters (see, e.g., xvii-xviii), a user group far different than the user's of Foladare's telecommunications device. For example, "Like the DAD486x, this manual was developed with the operator in mind." [xvii] Because a key, distinctive feature of DAD is its user interface, the DAD manual teaches away from combining it with an alternate interface designed for a different user population with different needs.

Foladare + the Sony Minidisc Recorder Manual

67. Requester asserts:

> Foladare discloses a digital radio subscription service enabling a subscriber to remotely define and identify playlists of content selected from a database for transmission to the subscriber's radio. PA-C (Foladare), at col. 2, l. 66 - col. 3, l. 7. Foladare discloses that the digital radio could be a "portable radio". PA-C (Foladare), at col. 4, ll. 46-51.
>
> In keeping with the established practice of "borrowing" controls from standalone audio devices, one skilled in the art presented with this disclosure of Foladare would have reason to turn to teachings relating to controls (e.g., buttons) associated with standalone audio players, such as the one disclosed in the Sony Minidisc Recorder Manual. Thus, it would have been obvious to combine the teachings of Foladare and the playback controls of Sony Minidisc Recorder Manual to arrive at claims 1 and 14.

68. The combination of Foladare + Sony Minidisc Recorder Manual does not teach all of the limitations of either Claim 1 or 14 of the '178 Patent.

69. Foladare does not have a file that contains "data specifying an ordered sequence of a collection of said separate digital compressed audio program files." This data sequencing file, since it does not exist, is not downloaded over a communications port and is not persistently stored in the digital memory of an audio program player.

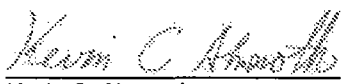
70. Requester cites to Foladare's "playlist" as meeting the requirements of the sequencing file, but (1) Foladare's playlists are only stored at the server and (2) only an "assembled playlist" is ever transmitted to a user. See, for example, Figure 2, which describes creating a playlist at the subscription control system. Figure 3 describes the process of requesting an "assembled playlist" from the subscription control system; in particular, see Steps 158, 160, 162, 164, and 166 (and associated text at 6:57-7:18). The playlist received at the digital radio is "a collection of one or more items of audio information such as music selections, news stories, and literary works." [2:29-31] "The completed playlist is then transmitted to the digital radio and stored in the data storage device for later playback by the audio output device. Optionally, the playlist may be immediately played back as it is received from the subscription control system." [3:17-28]

71. Further, there is no disclosure in Foladare that there is more than one of these completed or assembled playlists ever stored on the digital radio. Foladare only ever describes a single assembled playlist as being transmitted to a user's digital radio at a time. This would be consistent with the understanding of a person of ordinary skill in the art given that storage space on a digital radio would be limited and only have the capacity for a single, limited-duration assembled playlist. Therefore, Foladare does not disclose "downloading a plurality of separate digital compressed audio program files."

72. Requester attempts to combine Foladare with the Sony Minidisc Recorder Manual under the guise of "In keeping with the established practice of 'borrowing' controls from standalone audio devices, one skilled in the art presented with this disclosure of Foladare would have reason to turn to teachings relating to controls (e.g., buttons) associated with standalone audio players, such as the one disclosed in the Sony Minidisc Recorder Manual." [Re-Exam Request, Pg. 133] Such a combination would be unreasonable because the assembled playlist described by Foladare is a single continuous file of content. Incorporating "buttons" from the Sony Minidisc Recorder would not offer any desirable functionality. There are no "tracks" disclosed in Foladare. A "skip" function would only move to the end of file and stop. A "rewind" function would only move to the beginning of the file. Further, the functionality of the rewind button would be the same regardless of how many times it was pressed. Because Claim 14 requires following the ordering of the sequence file, a combination of Foladare + Sony Minidisc Recording Manual would not disclose limitations of Claim 14.

I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18, United States Code, and that such willful false statements made may jeopardize the validity of U.S. Patent 7,508,178.

DATE: July 16, 2010



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Education

Ph.D.	June 1997	*Georgia Institute of Technology*	Computer Science
		Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia Systems	
		Minor: Telecommunications Public Policy	
M.S.	June 1994	*Georgia Institute of Technology*	Computer Science
		Specialization: Networking and Systems	
B.S.	June 1992	*Georgia Institute of Technology*	Computer Science
(high honors)		*Minors*: Economics, Technical Communication, American Literature	

Employment History

Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 2005 -- present
Associate Dean	College of Engineering University of California Santa Barbara, CA	Mar 2007 -- Aug 2009
Vice Chair	Department of Computer Science University of California Santa Barbara, CA	Jul 2000 -- Nov 2005
Associate Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 2001 -- Jun 2005

Assistant Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 1997 -- Jun 2001
Graduate Researcher	Broadband Telecommunications Center Georgia Center for Adv Telecom Tech Atlanta, GA	Sep 1996--Jun 1997
Graduate Intern	IBM T.J. Watson Research Labs Hawthorne, NY	Jun 1995--Sep 1995
Support Specialist	Office of Information Technology Georgia Institute of Technology Atlanta, GA	Sep 1995--Jun 1997
Research Assistant	College of Computing Georgia Institute of Technology Atlanta, GA	Jan 1994--Mar 1994
Graduate Intern	Hitachi Telecommunications Norcross, GA	Jun 1992--Sep 1992

Industry Technical Advising

Co-Founder & Chairman of the Board	Santa Barbara Labs, LLC Santa Barbara, CA	Sep 2007 -- present
Board of Advisors	Airplay Inc. San Francisco, CA	Jun 2005 -- Aug 2009
Consultant	Lockheed Martin Corporation San Jose, CA	Nov 1999 -- present
Board of Directors	Techknowledge Point Santa Barbara, CA	May 2001 -- present
Technical Advisory Board	Occam Networks, Inc. Santa Barbara, CA	May 2000 -- present
Board of Advisors	Santa Barbara Technology Group Santa Barbara, CA	Sep 2000 -- Dec 2004
Board of Directors	Virtual Bandwidth, Inc. Santa Barbara, CA	Nov 2000 -- Jun 2001

Board of Advisors & Affiliated Scientist	Digital Fountain San Francisco, CA	Jan 2000 -- Dec 2001
Senior Technologist	IP Multicast Initiative, Stardust Forums Campbell, CA	Jun 1998 -- Dec 2000

I. Teaching

A. Courses Taught

CS 176A	Intro to Computer Communication Networks	Fall 1997, Fall 1998, Fall 2002, Fall 2003, Fall 2004, Spring 2005, Spring 2006, Spring 2007, Spring 2008, Fall 2008, Fall 2009
CS 176B	Network Computing	Winter 2000, Winter 2001, Winter 2002
MAT 201B	Media Networks and Services	Fall 1999, Fall 2000, Fall 2001, Fall 2003
CS 276	Distributed Computing and Computer Networks	Winter 1999, Spring 2000, Fall 2002, Fall 2005
CS 290I	Networking for Multimedia Systems	Winter 1998, Spring 1999, Fall 2004, Winter 2010
CS 595N	Technology and Society	Winter 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009
CS 595N	Economic Systems Seminar	Winter 2004, Spring 2004, Winter 2005, Spring 2005
CS 595N	Networking Seminar	Winter 1999, Fall 1999, Winter 2003
CS 595N	Wireless Networking & Multimedia Seminar	Fall 2000
CS 595I	Systems Design and Implementation Seminar	Fall 1999, Fall 2000, Winter 2001, Spring 2001, Winter 2002, Spring 2002

B. Other Teaching Experience

- *The Evolution of Advanced Networking Services: From the ARPAnet to Internet2*, Instructor, Summer 2001. Short course taught at Escuela de Ciencias Informatica (ECI) sponsored by the Universidad de Buenos Aires.
- *Johns Hopkins Center for Talented Youth*, Instructor, Summer 1994. CTY is a program to teach gifted high school students the fundamentals of computer science.
- *Georgia Institute of Technology*, Graduate Teaching Assistant, Sep 1994--Sep 1996. Worked as a

TA for 12 quarters teaching 7 different courses (4 undergraduate and 3 graduate).

C. Ph.D. Students Advised [11 graduated and 3 current]

14. Daniel Havey
    Research Area: *Military Communication Networks*
    Date Started: Spring 2008
13. Lara Deek
    Research Area: *Delay Tolerant Networks*
    Date Started: Fall 2006
12. Mike Wittie
    Research Area: *Military Communication Networks*
    Date Started: Spring 2006
11. Allan Knight
    Research Area: *Supporting Integration of Educational Technologies and Research of Their Effects on Learning*
    Date Started: Fall 2002
    Date Graduated: Summer 2009
    First Position: Research Scientist, Citrix Online
10. Hangjin Zhang
    Research Area: *Towards Blended Learning: Educational Technology to Improve and Assess Teaching and Learning*
    Date Started: Fall 2002
    Date Graduated: Spring 2009
    First Position: Microsoft
9. Gayatri Swamynathan
    Dissertation Title: *Towards Reliable Reputations for Distributed Applications*
    Date Started: Fall 2003
    Date Graduated: Spring 2008
    First Position: Zynga
8. Amit Jardosh (co-advised with E. Belding)
    Dissertation Title: *Adaptive Large-Scale Wireles Networks: Measurements, Protocol Designs, and Simulation Studies*
    Date Started: Spring 2003
    Date Graduated: Fall 2007
    First Position: Yahoo!
7. Khaled Harras
    Dissertation Title: *Protocol and Architectural Challenges in Delay and Disruption Tolerant Networks*
    Date Started: Fall 2002
    Date Graduated: Summer 2007
    First Position: Assistant Professor, Carnegie Mellon University
6. Krishna Ramachandran (co-advised with E. Belding)
    Dissertation Title: *Design, Deployment, and Management of High-Capacity Wireless Mesh Networks*
    Date Started: Fall 2003
    Date Graduated: Winter 2006
    First Position: Research Scientist, Citrix Online
5. Robert Chalmers
    Dissertation Title: *Improving Device Mobility with Intelligence at the Network Edge*

Date Started: Spring 1999
Date Graduated: Summer 2004
First Position: President and CEO, Limbo.net

4. Prashant Rajvaidya
Dissertation Title: *Achieving Robust and Secure Deployment of Multicast*
Date Started: Winter 1999
Date Graduated: Spring 2004
First Position: President and CTO, Mosaic Networking

3. Sami Rollins
Dissertation Title: *Overcoming Resource Constraints to Enable Content Exchange Applications in Next-Generation Environments*
Date Started: Spring 1999
Date Graduated: Spring 2003
First Position: Assistant Professor, Mount Holyoke College

2. Srinivasan Jagannathan
Dissertation Title: *Multicast Tree-Based Congestion Control and Topology Management*
Date Started: Fall 1999
Date Graduated: Spring 2003
First Position: Consultant, Kelly & Associates

1. Kamil Sarac
Dissertation Title: *Supporting a Robust Multicast Service in the Global Infrastructure*
Date Started: Spring 1998
Date Graduated: Spring 2002
First Position: Assistant Professor, UT-Dallas

D. M.S. Students Advised (Thesis/Project Option) [18 graduated and 0 current]

18. Camilla Fiorese
Research Area: *Analysis of a Pure Rate-Based Congestion Control Algorithm*
Date Graduated: Summer 2009

17. Brian Weiner
Research Area: *Multi-Socket TCP: A Simple Approach to Improve Performance of Real-Time Applications over TCP*
Date Graduated: Fall 2007

16. Avijit Sen Mazumder
Research Area: *Facilitating Robust Multicast Group Management*
Date Graduated: Fall 2005

15. Rishi Matthew
Thesis Title: *Providing Seamless Access to Multimedia Content on Heterogeneous Platforms*
Date Graduated: Summer 2004

14. Camden Ho
Research Area: *Tools and Techniques for Wireless Network Management*
Date Graduated: Spring 2004

13. Amit Jardosh (co-advised with E. Belding)
Research Area: *Realistic Environment Models for Mobile Network Evaluation*
Date Graduated: Spring 2004

12. Nitin Solanki
Research Area: *SongWand: A Wireless Barcode Scanner Using Bluetooth Technology*
Date Graduated: Winter 2004

11. Vrishali Wagle (co-advised with E. Belding)

Research Area: *An Ontology-Based Service Discovery Mechanism*
Date Graduated: Winter 2004

10. Uday Mohan
    Thesis Title: *Scalable Service Discovery in Mobile Ad hoc Networks*
    Date Graduated: Spring 2003
9. Krishna Ramachandran
    Thesis Title: *Ubiquitous Multicast*
    Date Graduated: Spring 2003
8. John Slonaker
    Thesis Title: *Inductive Loop Signature Acquisition Techniques*
    Date Graduated: Spring 2002
7. Mohammad Battah
    Thesis Title: *Dedicated Short-Range Communications Intelligent Transportation Systems Protocol (DSRC-ITS)*
    Date Graduated: Spring 2002
6. Kevin Vogel
    Thesis Title: *Integrating E-Commerce Applications into Existing Business Infrastructures*
    Date Graduated: Spring 2001
5. Sami Rollins
    Thesis Title: *Audio XmL: Aural Interaction with XML Documents*
    Date Graduated: Winter 2000
4. Andy Davis
    Thesis Title: *Stream Scheduling for Data Servers in a Scalable Interactive TV System*
    Date Graduated: Spring 1999
3. David Makofske
    Thesis Title: *MHealth: A Real-Time Graphical Multicast Monitoring Tool*
    Date Graduated: Winter 1999
2. Prashant Rajvaidya
    Thesis Title: *MANTRA: Router-Based Monitoring and Analysis of Multicast Traffic*
    Date Graduated: Winter 1999
1. Alex DeCastro (co-advised with Yuan-Fang Wang)
    Thesis Title: *Web-Based Collaborative 3D Modeling*
    Date Graduated: Winter 1998

E. Teaching Awards

2006-2007 UCSB Academic Senate Distinguished Teaching Award
2004-2005 Computer Science Outstanding Faculty Member
2000-2001 UCSB Spotlight on Excellence Award
1999-2000 Computer Science Outstanding Faculty Member (co-recipient)
1998-1999 Computer Science Outstanding Faculty Member (co-recipient)
1997-1998 Computer Science Outstanding Faculty Member

II. Research

A. Journal Papers, Magazine Articles, Books, and Book Chapters

1. A. Jardosh, K. Papagiannaki, E. Belding, K. Almeroth, G. Iannaccone, and B. Vinnakota, "Green WLANs: On-Demand WLAN Infrastructures", ACM Journal on Mobile Networks and Applications (MONET), vol. 14, num. 6, pp. xxx-xxx, December 2009.

2. M. Wittie, K. Harras, K. Almeroth, and E. Belding, "On the Implications of Routing Metric Staleness in Delay Tolerant Networks", Computer Communications Special Issue on Delay and Disruption Tolerant Networking, vol. 32, num. 16, pp. 1699-1709, October 2009.

3. K. Harras, L. Deek, C. Holman, and K. Almeroth, "DBS-IC: An Adaptive Data Bundling System for Intermittent Connectivity", Computer Communications Special Issue on Delay and Disruption Tolerant Networking, vol. 32, num. 16, pp. 1687-1698, October 2009.

4. S. Karpinski, E. Belding, K. Almeroth, and J. Gilbert, "Linear Representations of Network Traffic", ACM Journal on Mobile Networks and Applications (MONET), vol. 14, num. 4, pp. 368-386, August 2009.

5. K. Harras and K. Almeroth, "Controlled Flooding in Disconnected Sparse Mobile Networks", Wireless Communications and Mobile Computing (WCMC) Journal, vol. 9, num. 1, pp. 21-23, January 2009.

6. R. Mayer, A. Stull, K. DeLeeuw, K. Almeroth, B. Bimber, D. Chun, M. Bulger, J. Campbell, A. Knight, and H. Zhang, "Clickers in College Classrooms: Fostering Learning with Questioning Methods in Large Lecture Classes", Contemporary Educational Psychology, vol. 34, num. 1, pp. 51-57, January 2009.

7. A. Knight, K. Almeroth, and B. Bimber, "Design, Implementation and Deployment of PAIRwise", Journal of Interactive Learning Research (JILR), vol. 19, num. 3, pp. 489-508, July 2008.

8. A. Garyfalos and K. Almeroth, "Coupons: A Multilevel Incentive Scheme for Information Dissemination in Mobile Networks", IEEE Transactions on Mobile Computing, vol. 7, num. 6, pp. 792-804, June 2008.

9. I. Sheriff, K. Ramachandran, E. Belding, and K. Almeroth, "A Multi-Radio 802.11 Mesh Network Architecture", ACM Journal on Mobile Networks and Applications (MONET), vol. 13, num. 1-2, pp. 132-146, April 2008.

10. M. Bulger, R. Mayer, K. Almeroth, and S. Blau, "Measuring Learner Engagement in Computer-Equipped College Classrooms", Journal of Educational Multimedia and Hypermedia, vol. 17, num. 2, pp. 129-143, April 2008.

11. G. Swamynathan, B. Zhao, and K. Almeroth, "Exploring the Feasibility of Proactive Reputations", Concurrency and Computation: Practice and Experience, vol. 20, num. 2, pp. 155-166, February 2008.

12. G. Swamynathan, B. Zhao, K. Almeroth, and H. Zheng, "Globally Decoupled Reputations for Large Distributed Networks", Advances in Multimedia, vol. 2007, pp. 1-14, 2007.

13. R. Mayer, A. Stull, J. Campbell, K. Almeroth, B. Bimber, D. Chun and A. Knight, "Overestimation Bias in Self-reported SAT Scores", Educational Psychology Review, vol. 19, num. 4, pp. 443-454, December 2007.

14. P. Namburi, K. Sarac and K. Almeroth, "Practical Utilities for Monitoring Multicast Service Availability", Computer Communications Special Issue on Monitoring and Measurement of IP Networks, vol. 29, num. 10, pp. 1675-1686, June 2006.

15. H. Lundgren, K. Ramachandran, E. Belding, K. Almeroth, M. Benny, A. Hewatt, A. Touma and A. Jardosh, "Experience from the Design, Deployment and Usage of the UCSB MeshNet Testbed", IEEE Wireless Communications, vol. 13, num. 2, pp. 18-29, April 2006.

16. R. Chalmers, G. Krishnamurthi and K. Almeroth, "Enabling Intelligent Handovers in Heterogeneous Wireless Networks", ACM Journal on Mobile Networks and Applications (MONET), vol. 11, num. 2, pp. 215-227, April 2006.

17. R. Mayer, K. Almeroth, B. Bimber, D. Chun, A. Knight and A. Campbell, "Technology Comes to College: Understanding the Cognitive Consequences of Infusing Technology in College Classrooms", Educational Technology, vol. 46, num. 2, pp. 48-53, March-April 2006.

18. A. Garyfalos and K. Almeroth, "A Flexible Overlay Architecture for Mobile IPv6 Multicast", Journal on Selected Areas in Communications (JSAC) Special Issue on Wireless Overlay Networks Based on Mobile IPv6, vol. 23, num. 11, pp. 2194-2205, November 2005.

19. K. Sarac and K. Almeroth, "Monitoring IP Multicast in the Internet: Recent Advances and Ongoing Challenges", IEEE Communications, vol. 43, num. 10, pp. 85-91, October 2005.

20. K. Sarac and K. Almeroth, "Application Layer Reachability Monitoring for IP Multicast", Computer Networks, vol. 48, num. 2, pp. 195-213, June 2005.

21. S. Rollins and K. Almeroth, "Evaluating Performance Tradeoffs in a One-to-Many Peer Content Distribution Architecture", Journal of Internet Technology, vol. 5, num. 4, pp. 373-387, Fall 2004.

22. A. Jardosh, E. Belding, K. Almeroth and S. Suri, "Real-world Environment Models for Mobile Network Evaluation", Journal on Selected Areas in Communications Special Issue on Wireless Ad hoc Networks, vol. 23, num. 3, pp. 622-632, March 2005.

23. K. Sarac and K. Almeroth, "Tracetree: A Scalable Mechanism to Discover Multicast Tree Topologies in the Network", IEEE/ACM Transactions on Networking, vol. 12, num. 5, pp. 795-808, October 2004.

24. K. Sarac and K. Almeroth, "A Distributed Approach for Monitoring Multicast Service Availability", Journal of Network and Systems Management, vol. 12, num. 3, pp. 327-348, September 2004.

25. P. Rajvaidya, K. Ramachandran and K. Almeroth, "Managing and Securing the Global Multicast Infrastructure", Journal of Network and Systems Management, vol. 12, num. 3, pp. 297-326, September 2004.

26. P. Rajvaidya and K. Almeroth, "A Study of Multicast Routing Instabilities", IEEE Internet Computing, vol. 8, num. 5, pp. 42-49, September/October 2004.

27. D. Johnson, R. Patton, B. Bimber, K. Almeroth and G. Michaels, "Technology and Plagiarism in the University: Brief Report of a Trial in Detecting Cheating", Association for the Advancement of Computing in Education (AACE) Journal, vol. 12, num. 3, pp. 281-299, Summer 2004.

28. R. Chalmers and K. Almeroth, "A Security Architecture for Mobility-Related Services", Journal of Wireless Personal Communications, vol 29, num. 3, pp. 247-261, June 2004.

29. S. Rollins and K. Almeroth, "Lessons Learned Deploying a Digital Classroom", Journal of Interactive Learning Research (JILR), vol. 15, num. 2, pp. 169-185, April 2004.

30. B. Stiller, K. Almeroth, J. Altmann, L. McKnight, and M. Ott, "Pricing for Content in the Internet", Computer Communications, vol. 27, num. 6, pp. 522-528, April 2004.

31. S. Jagannathan and K. Almeroth, "A Dynamic Pricing Scheme for E-Content at Multiple Levels-of-Service", Computer Communications, vol. 27, num. 4, pp. 374-385, March 2004.

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C. Workshop Papers (refereed)

1. D. Havey, R. Chertov, and K. Almeroth, "Wired Wireless Broadcast Emulation," *International Workshop on Wireless Network Measurement (WiNMee)*, Seoul, Korea, June 2009.

2. R. Raghavendra, P. Acharya, E. Belding, and K. Almeroth, "MeshMon: A Multi-Tiered Framework for Wireless Mesh Network Monitoring", *ACM Mobihoc Wireless of the Students, by the Students, for the Students Workshop (S3)*, New Orleans, Louisiana, USA, May 2009.

3. G. Swamynathan, C. Wilson, B. Boe, B. Zhao, and K. Almeroth, "Do Social Networks Improve e-Commerce: A Study on Social Marketplaces", *ACM Sigcomm Workshop on Online Social Networks (WOSN)*, Seattle, Washington, USA, August 2008.

4. R. Raghavendra, E. Belding, and K. Almeroth, "Antler: A Multi-Tiered Approach to Automated Wireless Network Management", *IEEE Workshop on Automated Network Management (ANM)*, Phoenix, Arizona, USA, April 2008.

5. S. Karpinski, E. Belding, and K. Almeroth, "Towards Realistic Models of Wireless Workload", *International Workshop on Wireless Network Measurement (WiNMee)*, Limassol, CYPRUS, April 2007.

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11. A. Jardosh, K. Ramachandran, K. Almeroth and E. Belding, "Understanding Link-Layer Behavior in Highly Congested IEEE 802.11b Wireless Networks", Sigcomm Workshop on Experimental Approaches to Wireless Network Design and Analysis (EWIND), Philadelphia, Pennsylvania, USA, August 2005.

12. Y. Sun, I. Sheriff, E. Belding and K. Almeroth, "An Experimental Study of Multimedia Traffic Performance in Mesh Networks", MobiSys International Workshop on Wireless Traffic Measurements and Modeling (WitMeMo), Seattle, Washington, USA, June 2005.

13. A. Sen Mazumder, K. Almeroth and K. Sarac, "Facilitating Robust Multicast Group Management", *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Skamania, Washington, USA, June 2005.

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15. A. Garyfalos, K. Almeroth and K. Sanzgiri, "Deployment Complexity Versus Performance Efficiency in Mobile Multicast", *International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWiM)*, San Jose, California, USA, October 2004.

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17. A. Garyfalos, K. Almeroth and J. Finney, "A Hybrid of Network and Application Layer Multicast for Mobile IPv6 Networks", *International Workshop on Large-Scale Group Communication (LSGC)*, Florence, ITALY, October 2003.

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30. K. Almeroth and M. Ammar, "Collection and Modeling of the Join/Leave Behavior of Multicast Group Members in the MBone", *High Performance Distributed Computing Focus Workshop (HPDC)*, Syracuse, New York, USA, August 1996.

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D. Non-Refereed Publications

1. K. Almeroth, R. Caceres, A. Clark, R. Cole, N. Duffield, T. Friedman, K. Hedayat, K. Sarac, M. Westerlund, "RTP Control Protocol Extended Reports (RTCP XR)", *Internet Engineering Task Force (IETF) Request for Comments 3611*, November 2003.

2. Z. Albanna, K. Almeroth, D. Meyer, and M. Schipper, "IANA Guidelines for IPv4 Multicast Address Allocation", *Internet Engineering Task Force (IETF) Request for Comments 3171*, August 2001.

3. B. Quinn and K. Almeroth, "IP Multicast Applications: Challenges and Solutions ", *Internet Engineering Task Force (IETF), Request for Comments 3170*, September 2001.

4. K. Almeroth, L. Wei and D. Farinacci, "Multicast Reachability Monitor (MRM) Protocol", *Internet*

Engineering Task Force Internet Draft, July 2000.

5. K. Almeroth and L. Wei, "Justification for and use of the Multicast Reachability Monitor (MRM) Protocol", *Internet Engineering Task Force Internet Draft*, March 1999.

6. K. Almeroth, "Managing IP Multicast Traffic: A First Look at the Issues, Tools, and Challenges", IP Multicast Initiative White Paper, San Jose, California, USA, February 1999.

7. K. Almeroth, K. Obraczka and D. De Lucia, "Pseudo-IP: Providing a Thin Network Protocol for Semi-Intelligent Wireless Devices", *DARPA/NIST Smart Spaces Workshop*, Gaithersburg, Maryland, USA, July 1998 .

E. Released Software Systems

1. ***A Multi-radio Wireless Mesh Network Architecture -- http://moment.cs.ucsb.edu/tic/.*** Released December 1, 2006 (with K. Ramachandran, I. Sheriff, and E. Belding). The software as part of a multi-radio wireless mesh network that includes a Split Wireless Router that alleviates the interference that can occur between commodity radios within a single piece of hardware. The second is server software to perform channel assignment and communicate the assignments throughout the mesh network.

2. ***AODV-Spanning Tree (AODV-ST) -- http://www.cs.ucsb.edu/~krishna/aodv-st/.*** Released September 1, 2006 (with K. Ramachandran and E. Belding). AODV-ST is an extension of the well-known AODV protocol specifically designed for wireless mesh networks. The advantages of AODV-ST over AODV include support for high throughput routing metrics, automatic route maintenance for common-case traffic, and low route discovery latency.

3. ***The Multicast Detective -- http://www.nmsl.cs.ucsb.edu/mcast_detective/.*** Released September 1, 2005 (with A. Sen Mazumder). The multicast detective is a robust solution to determine the existence and nature of multicast service for a particular user. By performing a series of tests, a user can determine whether there is network support for multicast, and consequently, whether a multicast group join is likely to succeed.

4. ***AutoCap: Automatic and Accurate Captioning -- http://www.nmsl.cs.ucsb.edu/autocap/.*** Released August 1, 2005 (with A. Knight). AutoCap is a software system that takes as input an audio/video file and a text transcript. AutoCap creates captions by aligning the utterances in the audio/video file to the transcript. For those words that are not recognized, AutoCap estimates when the words were spoken along with an error bound that gives the content creator an idea of caption accuracy. The result is a collection of accurately time-stamped captions that can be displayed with the video.

5. ***PAIRwise Plagiarism Detection System -- http://cits.ucsb.edu/pair/.*** Released July 1, 2005 (with A. Knight). PAIRwise is a plagiarism detection system with: (1) an easy-to-use interface for submitting papers, (2) a flexible comparison engine that allows intra-class, inter-class, and Internet-based comparisons, and (3) an intuitive graphical presentation of results.

6. ***DAMON Multi-Hop Wireless Network Monitoring -- http://moment.cs.ucsb.edu/damon/.*** Released October 1, 2004 (with K. Ramachandran and E. Belding). DAMON is a distributed system for monitoring multi-hop mobile networks. DAMON uses agents within the network to monitor network behavior and send collected measurements to data repositories. DAMON's

generic architecture supports the monitoring of a wide range of protocol, device, or network parameters.

7. ***Multicast Firewall -- http://www.nmsl.cs.ucsb.edu/mafia/.*** Released June 1, 2004 (with K. Ramachandran). MAFIA, a multicast firewall and traffic management solution, has the specific aim of strengthening multicast security through multicast access control, multicast traffic filtering, and DoS attack prevention.

8. ***AODV@IETF Peer Routing Software-- http://moment.cs.ucsb.edu/aodv-ietf/.*** Released November 1, 2003 (with K. Ramachandran and E. Belding). One of the first large-scale efforts to run the Ad hoc On demand Distance Vector (AODV) routing protocol in a public space (at the Internet Engineering Task Force (IETF)). The implementation includes a daemon that runs on both the Linux and Windows operating systems.

9. ***Mobility Obstacles -- http://moment.cs.ucsb.edu/mobility/.*** Released September 1, 2003 (with A. Jardosh, E. Belding, and S. Suri). The topology and movement of nodes in ad hoc protocol simulation are key factors in protocol performance. In this project, we have developed ns-2 simulation plug-ins that create more realistic movement models through the incorporation of obstacles. These obstacles are utilized to restrict both node movement and wireless transmissions.

10. ***mwalk -- http://www.nmsl.cs.ucsb.edu/mwalk/.*** Released December 1, 2000 (with R. Chalmers). Mwalk is a collection of Java applications and Perl scripts which re-create a global view of a multicast session from mtrace and RTCP logs. Users to the site can download mwalk, examine the results of our analysis, or download data sets for use in simulations dependent on multicast tree characteristics.

11. ***MANTRA2 -- http://www.nmsl.cs.ucsb.edu/mantra/.*** Released December 1, 1999 (with P. Rajvaidya). This new version of MANTRA focuses on the visualization of inter-domain routing statistics. Working in conjunction with the Cooperative Association for Internet Data Analysis (CAIDA) we have developed advanced collection and visualization techniques.

12. ***MRM -- http://www.nmsl.cs.ucsb.edu/mrm/.*** Released October 1, 1999 (with K. Sarac). MRM is the Multicast Reachability Protocol. We have implemented an end-host agent that responds to MRM Manager commands. Our end-host agent works in conjunction with Cisco routers to detect and isolate multicast faults.

13. ***MANTRA -- http://www.nmsl.cs.ucsb.edu/mantra/.*** Released January 1, 1999 (with P. Rajvaidya). MANTRA is the Monitoring and Analysis of Traffic in Multicast Routers. It uses scripts to collect and display data from backbone multicast routers.

14. ***SDR Monitor -- http://www.nmsl.cs.ucsb.edu/sdr-monitor/.*** Released January 1, 1999 (with K. Sarac). The SDR Monitor receives e-mail updates from participants containing information about observed sessions in the MBone. A global view of multicast reachability is then constructed.

15. ***The MHealth tool -- http://www.nmsl.cs.ucsb.edu/mhealth/.*** Released September 1, 1998 (with D. Makofske). The mhealth tool graphically visualizes MBone multicast group trees and provides 'health' information including end-to-end losses per receiver and losses on a per hop basis. The implementation required expertise in Java, the MBone tools, and Unix.

16. ***The MControl tool -- http://www.nmsl.cs.ucsb.edu/mcontrol/.*** Released August 1, 1998 (with D. Makofske). Mcontrol is a tool to provide VCR-based interactivity for live MBone sessions. The

implementation required expertise in Java, the MBone tools, and Unix.

17. ***Interactive Multimedia Jukebox (IMJ) -- http://imj.ucsb.edu/.*** Released October 1, 1996. The IMJ combines the WWW and the MBone conferencing tools to provide a multi-channel video jukebox offering both instructional and entertainment programming on a wide scale. The implementation required expertise in HTML, Perl, C, the MBone tools, and Unix.

18. ***Mlisten -- http://www.cc.gatech.edu/computing/Telecomm/mbone/.*** Released September 1, 1995. A tool to continuously collect MBone multicast group membership information including number and location of members, membership duration, and inter-arrival time for all audio and video sessions. The implementation required expertise in C, Tcl/Tk, the MBone tools, and UNIX socket programming.

19. ***Audio-on-Demand (AoD).*** March 1, 1995. A server/client prototype to demonstrate interactivity in near VoD systems. The AoD server provides songs-on-demand and VCR-like functions via multicast IP over Ethernet. The implementation required expertise in C, OpenWindows programming, UNIX socket programming, and network programming.

F. Tutorials, Panels and Invited Talks

- "Medium Access in new Contexts: Reinventing the Wheel?", USC Invited Workshop on Theory and Practice in Wireless Networks, Los Angeles, California, USA, May 2008.
- "The Wild, Wild West: Wireless Networks Need a New Sheriff", University of Florida CISE Department Lecture Series, Gainesville, Florida, USA, February 2008.
- "Distinguishing Between Connectivity, Intermittent Connectivity, and Intermittent Disconnectivity", Keynote at the ACM MobiCom Workshop on Challenged Networks (CHANTS), Montreal, CANADA, September 2007.
- "The Three Ghosts of Multicast: Past, Present, and Future", Keynote at the Trans-European Research and Education Networking Association (TERENA) Networking Conference, Lynby, DENMARK, May 2007.
- "Multicast Help Wanted: From Where and How Much?", Keynote at the Workshop on Peer-to-Peer Multicasting (P2PM), Las Vegas, Nevada, USA, January 2007.
- "The Confluence of Wi-Fi and Apps: What to Expect Next", Engineering Insights, UC-Santa Barbara, Santa Barbara, California, USA, October 2006.
- "Challenges, Opportunities, and Implications for the Future Internet", University of Minnesota Digital Technology Center, Minneapolis, Minnesota, USA, September 2006.
- "Wireless Technology as a Catalyst: Possibilities for Next-Generation Interaction", Santa Barbara Forum on Digital Transitions, Santa Barbara, California, USA, April 2006.
- "Challenges and Opportunities in an Internet with Pervasive Wireless Access", University of Texas--Dallas Computer Science Colloquium, Dallas, Texas, USA, March 2006.

- "Challenges and Opportunities with Pervasive Wireless in the Internet", Duke University Computer Science Colloquium, Durham, North Carolina, USA, February 2006.
- "The Span From Wireless Protocols to Social Applications", Intel Research Labs, Cambridge, United Kingdom, December 2005.
- "The Internet Dot.Com Bomb and Beyond the Dot.Com Calm", CSE IGERT and Cal Poly Lecture Series, San Luis Obispo, California, USA, October 2005.
- "Panel: Directions in Networking Research", IEEE Computer Communications Workshop (CCW), Irvine, California, USA, October 2005.
- "Economic Incentives for Ad Hoc Networks", KAIST New Applications Seminar, Seoul, South Korea, March 2004.
- "New Applications for the Next Generation Internet", Citrix Systems, Santa Barbara, California, USA, March 2004.
- "PI: The Imperfect Pursuit of Pure Pattern", CITS Visions in Technology Series, Santa Barbara, California, USA, January 2004.
- "Panel: Core Networking Issues and Protocols for the Internet", National Science Foundation (NSF) Division of Advanced Networking Infrastructure and Research (ANIR) Principal Investigators Workshop, Washington DC, USA, March 2003.
- "Panel: Pricing for Content in the Internet", SPIE ITCom Internet Performance and Control of Network Systems, Boston, Massachusetts, USA, July 2002.
- "The Technology Behind Wireless LANs", Central Coast MIT Enterprise Forum, Santa Barbara, California, USA, March 2002.
- "Lessons Learned in the Digital Classroom", Center for Information and Technology Brown Bag Symposium, Santa Barbara, California, USA, March 2002.
- "The Evolution of Advanced Networking Services: From the ARPAnet to Internet2", California State University--San Luis Obispo CS Centennial Colloquium Series, San Luis Obispo, California, USA, February 2002.
- "Deployment of IP Multicast in Campus Infrastructures", Internet2 Campus Deployment Workshop, Atlanta, Georgia, USA, May 2001.
- "Multicast: Is There Anything Else to Do?", Sprint Research Retreat, Miami, Florida, USA, May 2001.
- "The Evolution of Next-Generation Internet Services and Applications", Government Technology Conference 2001 (GTC) for the Western Region, Sacramento, California, USA, May 2001.
- "I2 Multicast: Not WIDE-scale Deployment, FULL-scale Deployment", Closing Plenary, Internet2 Member Meetings, Washington, D.C., USA, March 2001.

- "Panel: Beyond IP Multicast", Content Delivery Networks (CDN), New York, New York, USA, February 2001.
- "Viable Multicast Pricing & Business Models for Wider-Scale Deployment", Content Delivery Networks (CDN), New York, New York, USA, February 2001.
- "IP Multicast: Modern Protocols, Deployment, and Management", Content Delivery Networks (CDN), New York, New York, USA, February 2001 & San Jose, California, USA, December 2001.
- "Under the Hood of the Internet", Technology 101: Technology for Investors, Center for Entrepreneurship & Engineering Management, November 2000.
- "Understanding Multicast Traffic in the Internet", (1) University of Virginia, (2) University of Maryland, and (3) Columbia University, September 2000.
- "The Bad, The Ugly, and The Good: The Past, Present, and Future of Multicast", Digital Fountain, San Francisco, California, USA, August 2000.
- "Implications of Source-Specific Multicast (SSM) on the Future of Internet Content Delivery", Occam Networks, Santa Barbara, California, USA, August 2000.
- "Introduction to Multicast Routing Protocols", UC-Berkeley Open Mash Multicast Workshop, Berkeley, California, USA, July 2000.
- "Efforts to Understand Traffic and Tree Characteristics", University of Massachusetts--Amherst Colloquia, Amherst, Massachusetts, USA, May 2000.
- "Monitoring Multicast Traffic", Sprint Research Retreat, Half Moon Bay, California, USA, April 2000.
- "What is the Next Generation of Multicast in the Internet?", HRL Laboratories, Malibu, California, USA, January 2000.
- "Mission and Status of the Center for Information Technology and Society (CITS)", Intel Research Council, Portland, Oregon, USA, September 1999.
- "Multicast at a Crossroads", IP Multicast Initiative Summits and Bandwidth Management Workshops, San Francisco, CA, USA, (1) October 1999; (2) February 2000; and (3) June 2000.
- "IP Multicast: Modern Protocols, Deployment, and Management", Networld+Interop: (1) Las Vegas, Nevada, USA--May 2000; (2) Tokyo, JAPAN--June 2000; (3) Atlanta, Georgia, USA--September 2000; (4) Las Vegas, Nevada, USA--May 2001; (5) Las Vegas, Nevada, USA--May 2002.
- "IP Multicast: Practice and Theory" (w/ Steve Deering), Networld+Interop: (1) Las Vegas, Nevada, USA--May 1999; (2) Tokyo, JAPAN--June 1999; and (3) Atlanta, Georgia, USA--September 1999.
- "Internet2 Multicast Testbeds and Applications", Workshop on Protocols for High Speed Networks (PfHSN), Salem, Massachusetts, USA, August 1999.

- "IP Multicast: Protocols for the Intra- and Inter-Domain", Lucent Technologies, Westford, Massachusetts, USA, August 1999.
- "Internet2 Multicast Testbeds and Applications", NASA Workshop: Bridging the Gap, Moffett Field, California, USA, August 1999.
- "The Evolution of Next-Generation Services and Applications in the Internet", Tektronix Distinguished Lecture Series, Portland, Oregon, USA, May 1999.
- "Multicast Applications and Infrastructure in the Next Generation Internet", CENIC 99 Workshop on Achieving Critical Mass for Advanced Applications, Monterey, California, USA, May 1999.
- "Multicast Traffic Monitoring and Analysis Work at UCSB" (w/ P. Rajvaidya), Workshop on Internet Statistics and Metrics Analysis (ISMA), San Diego, California, USA, April 1999.
- "How the Internet Works: Following Bits Around the World", Science Lite, Santa Barbara General Affiliates and Office of Community Relations, California, USA, February 1999.
- "Managing Multicast: Challenges, Tools, and the Future", IP Multicast Initiative Summit, San Jose, California, USA, February 1999.
- "The Future of Multicast Communication and Protocols", Internet Bandwidth Management Summit (iBAND), San Jose, California, USA, November 1998.
- "An Overview of IP Multicast: Applications and Deployment", (1) Workshop on Evaluating IP Multicast as the Solution for Webcasting Real-Time Networked Multimedia Applications, New York, New York, USA, July 1998; and (2) Satellites and the Internet Conference, Washington, D.C., USA, July 1998.
- "IETF Developments in IP Multicast", IP Multicast Initiative Summit, San Jose, California, USA, February 1998.
- "An Introduction to IP Multicast and the Multicast Backbone (MBone)" vBNS Technical Meeting sponsored by the National Center for Network Engineering (NLANR), San Diego, California, USA, February 1998.
- "Using Multicast Communication to Deliver WWW Pages" Computer Communications Workshop (CCW '97), Phoenix, Arizona, USA, September 1997.

G. Research Funding

- K. Almeroth, E. Belding and T. Hollerer, "NeTS-WN: Wireless Network Health: Real-Time Diagnosis, Adaptation, and Management", National Science Foundation (NSF), $600,000, 10/1/07-9/30/10.
- B. Manjunath, K. Almeroth, F. Bullo, J. Hespanha, T. Hollerer, C. Krintz, U. Madhow, K. Rose, A. Singh, and M. Turk, "Large-Scale Multimodal Wireless Sensor Network", Office of Naval Research Defense University Research Instrumentation Program (DURIP), $655,174, 4/14/08-4/14/09.

- K. Almeroth and E. Belding, "Improving Robustness in Evolving Wireless Infrastructures", Intel Corporation, $135,000, 7/1/06-6/30/09 (reviewed and renewed for second and third year).
- K. Almeroth and K. Sarac, "Bridging Support in Mixed Deployment Multicast Environments", Cisco Systems Inc., $100,000, 9/1/07-8/31/08.
- K. Sarac and K. Almeroth, "Building the Final Piece in One-to-Many Content Distribution", Cisco Systems Inc., $95,000, 9/1/06-8/31/07.
- E. Belding, K. Almeroth and J. Gibson, "Real-Time Communication Support in a Ubiquitous Next-Generation Internet", National Science Foundation (NSF), $900,000, 10/1/04-9/30/07.
- K. Almeroth and K. Sarac, "Improving the Robustness of Multicast in the Internet", Cisco Systems Inc., $80,000, 9/1/04-8/31/05.
- R. Mayer, B. Bimber, K. Almeroth and D. Chun, "Assessing the Pedagogical Implications of Technology in College Courses", Mellon Foundation, $350,000, 7/1/04-6/30/07.
- K. Almeroth, "Next-Generation Service Engineering in Internet2", University Consortium for Advanced Internet Development (UCAID), $905,000, 7/1/04-6/30/05 (reviewed and renewed each year).
- B. Bimber, A. Flanagin and C. Stol, "Technological Change and Collective Association: Changing Relationships Among Technology, Organizations, Society and the Citizenry", National Science Foundation (NSF), $329,175, 7/1/04-6/30/07.
- K. Almeroth and B. Bimber, "Plagiarism Detection Techniques and Software", UCSB Instructional Development, $22,000, 7/1/04-6/30/05.
- K. Almeroth, "Student Travel Support for the 14th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV)", National Science Foundation (NSF), $10,000, 5/1/04-8/31/04.
- K. Almeroth, "An Automated Indexing System for Remote, Archived Presentations", QAD Inc., $25,000, 5/1/04-6/30/05.
- K. Almeroth and M. Turk, "A Remote Teaching Assistant Support System", Microsoft, $40,000, 1/1/04-6/30/05.
- K. Almeroth, "Supporting Multicast Service Functionality in Helix", Real Networks, $30,000, 9/1/03-6/30/04.
- K. Almeroth and E. Belding, "Service Discovery in Mobile Networks", Nokia Summer Research Grant (U. Mohan), $10,240, 7/1/03-9/30/03.
- K. Almeroth, D. Zappala, "Building a Global Multicast Service", Cisco Systems Inc., $100,000, 1/1/03-indefinite.
- K. Almeroth, "Developing A Dynamic Protocol for Candidate Access Router Discovery", Nokia Graduate Student Fellowship (R. Chalmers), $26,110, 9/01/02-6/30/03.

- B. Bimber and K. Almeroth, "The Role of Collaborative Groupware in Organizations", Toole Family Foundation, $182,500 ($20,000 cash plus $162,500 in software), 9/1/02-indefinite.
- B. Manjunath, et. al., "Digital Multimedia: Graduate Training Program in Interactive Digital Multimedia", National Science Foundation (NSF), $2,629,373, 4/1/02-3/31/07.
- J. Green, K. Almeroth, et. al., "Inquiry in the Online Context: Learning from the Past, Informing the Future", UCSB Research Across Disciplines, $10,000, 9/1/01-8/31/02.
- K. Almeroth, "Monitoring and Maintaining the Global Multicast Infrastructure", Cisco Systems Inc., $54,600, 7/1/01-indefinite.
- R. Kemmerer, K. Almeroth, et. al., "Hi-DRA High-speed, Wide-area Network Detection, Response, and Analysis", Department of Defense (DoD), $4,283,500, 5/1/01-4/30/06.
- A. Singh, K. Almeroth, et. al., "Digital Campus: Scalable Information Services on a Campus-wide Wireless Network", National Science Foundation (NSF), 1,450,000, 9/15/00-12/31/04.
- K. Almeroth, "Visualizing the Global Multicast Infrastructure", UC MICRO w/ Cisco Systems Inc., $85,438, 7/1/00-6/30/02.
- H. Lee, K. Almeroth, et. al., "Dynamic Sensing Systems", International Telemetering Foundation, $260,000, 07/01/00-06/30/04.
- B. Bimber and K. Almeroth, "Funding for the Center on Information Technology and Society", $250,000 from Dialogic (an Intel Company) and $250,000 from Canadian Pacific.
- K. Almeroth, "CAREER: From Protocol Support to Applications: Elevating Multicast to a Ubiquitous Network Service", National Science Foundation (NSF), $200,000, 9/1/00-8/31/04.
- K. Almeroth, "Characterizing Multicast Use and Efficiency in the Inter-Domain", Sprint Advanced Technology Laboratories, $62,500, 3/1/00-indefinite.
- K. Almeroth, "Producing the Next Generation of Multicast Monitoring and Management Protocols and Tools", UC MICRO w/ Cisco Systems Inc., $124,500, 7/1/99 - 6/30/01.
- K. Almeroth, "Utilizing Satellite Links in the Provision of an Inter-Wide Multicast Service", HRL Laboratories, $20,000, 7/1/99 - indefinite.
- T. Smith, K. Almeroth, et. al., "Alexandria Digital Earth Prototype", National Science Foundation, $5,400,000, 4/1/99-3/31/04.
- V. Vesna, K. Almeroth, et. al., "Online Public Spaces: Multidisciplinary Explorations in Multi-User Environments (OPS:MEME), Phase II", UCSB Research Across Disciplines, $50,000, 9/1/98-8/31/99.
- K. Almeroth, "Techniques and Analysis for the Provision of Multicast Route Management", UC MICRO w/ Cisco Systems Inc., $97,610, 7/1/98 - 6/30/00.
- K. Almeroth, "Capturing and Modeling Multicast Group Membership in the Multicast Backbone

(MBone)", UC MICRO w/ Hughes Research Labs, $19,146, 7/1/98 - 12/31/99.

- K. Almeroth, "Building a Content Server for the Next Generation Digital Classroom", UCSB Faculty Research Grant, $5,000, 7/1/98-6/31/99.

H. Research Honors and Awards

- Finalist for Best Paper Award, IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON), June 2008
- Best Paper Award, Passive and Active Measurement (PAM) Conference, April 2007
- Outstanding Paper Award, World Conference on Educational Multimedia, Hypermedia & Telecommunications (ED MEDIA), June 2006
- IEEE Senior Member Status, June 2003
- Finalist for Best Student Paper Award, ACM Multimedia, December 2002
- Outstanding Paper Award, World Conference on Educational Multimedia, Hypermedia & Telecommunications (ED MEDIA), June 2002
- Computing Research Association (CRA) Digital Government Fellowship, 2001
- National Science Foundation CAREER Award, 2000
- Best Paper Award, 7th International World Wide Web Conference, April 1998

III. Service

A. Professional Activities

1. Society Memberships

Member, Association for Computing Machinery (ACM): 1993-present
Member, ACM Special Interest Group on Communications (SIGComm): 1993-present
Senior Member, Institute of Electrical and Electronics Engineers (IEEE): 1993-present
Member, IEEE Communications Society (IEEE ComSoc): 1993-present
Member, American Society for Engineering Education (ASEE): 2003-present

2. Review Work for Technical Journals and Publishers

NSF CISE research proposals, IEEE/ACM Transactions on Networking, IEEE/ACM Transactions on Computers, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Multimedia, IEEE Communications, IEEE Communications Letters, IEEE Network, IEEE Internet Computing, IEEE Multimedia, ACM Transactions on Internet Technology, ACM Transactions on Multimedia Computing, Communications and Applications, ACM Computing Surveys, ACM Computer Communications Review, ACM Computeres in Entertainment, ACM/Springer Multimedia Systems Journal, AACE Journal of Interactive Learning (JILR), International Journal of Computer Mathematics, Journal of Communications and Networks, Journal of Parallel and Distributed Computing, Journal of

Network and Systems Management, Journal of High Speed Networking, Journal of Communications and Networks, Journal on Selected Areas in Communications, Journal of Wireless Personal Communications, Personal Mobile Communications, Annals of Telecommunications, International Journal of Wireless and Mobile Computing, Pervasive and Mobile Computing (PMC), Wireless Networks Journal, Computer Networks Journal, Cluster Computing, Computer Communications, Mobile Computing and Communications Review, Performance Evaluation, Software--Practice & Experience, Information Processing Letters, ACM Sigcomm, ACM Multimedia, ACM Network and System Support for Digital Audio and Video Workshop (NOSSDAV), ACM Sigcomm Workshop on the Economics of Peer-to-Peer Systems (P2PEcon), ACM Sigcomm Workshop on Challenged Networks (CHANTS), IEEE Infocom, IEEE Globecom, IEEE Global Internet (GI) Symposium, IEEE Globecom Automatic Internet Symposium, IEEE Globecom Internet Services and Enabling Technologies (IS&ET) Symposium, IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM), IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON), IEEE International Conference on Multimedia and Exposition (ICME), IEEE International Conference on Communications (ICC), IEEE International Conference on Parallel and Distributed Systems (ICPADS) IEEE International Symposium on High-Performance Distributed Computing (HPDC), IEEE International Conference on Distributed Computing Systems (ICDCS), IEEE International Workshop on Quality of Service (IWQoS), IEEE/IFIP Network Operations and Management Symposium (NOMS), IFIP/IEEE International Symposium on Integrated Network Management (IM), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), SPIE Conference on Multimedia Computing and Networking (MMCN), IFIP Networking, IASTED International Conference on Information Systems and Databases (ISD), IASTED International Conference on Communications, Internet, and Information Technology, IASTED International Conference on Internet and Multimedia Systems and Applications (IMSA), IASTED International Conference on European Internet and Multimedia Systems and Applications (EuroIMSA), IASTED International Conference on Communications and Computer Networks (CCN), IASTED International Conference on Software Engineering and Applications (SEA), International Conference on Computer and Information Science (ICIS), International Association for Development of the Information Society (IADIS) International Conference on the WWW/Internet, Workshop on Network Group Communication (NGC), International Conference on Next Generation Communication (CoNEXT), International Conference on Parallel Processing (ICPP), International Conference on Computer Communications and Networks (IC3N), International Workshop on Hot Topics in Peer-to-Peer Systems (Hot-P2P), International Workshop on Wireless Network Measurements (WiNMee), International Workshop on Incentive-Based Computing (IBC), International Workshop on Multi-hop Ad Hoc Networks (REALMAN), International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWIM), International Packet Video (PV) Workshop, High Performance Networking Conference (HPN), International Parallel Processing Symposium (IPPS), International Symposium on Innovation in Information & Communication Technology (ISIICT), Workshop on Coordinated Quality of Service in Distributed Systems (COQODS), Pearson Education (Cisco Press) Publishers, Macmillan Technical Publishing, and Prentice Hall Publishers.

3. Conference Committee Activities

Journal/Magazine Editorial Board

ACM Computer Communications Review (CCR): 2006-present

IEEE Transactions on Mobile Computing (TMC): 2006-present
AACE Journal of Interactive Learning Research (JILR): 2003-present
ACM Computers in Entertainment: 2002-present
IEEE Network: 1999-present
IEEE/ACM Transactions on Networking (ToN): 2003-2009

Journal/Magazine Guest Editorship

IEEE Journal on Selected Areas in Communications (JSAC) Special Issue on "Delay and Disruption Tolerant Wireless Communication", June 2008
Computer Communications Special Issue on "Monitoring and Measuring IP Networks", Summer 2005
Computer Communications Special Issue on "Integrating Multicast into the Internet", March 2001

Conference/Workshop Steering Committee

IEEE International Conference on Network Protocols (ICNP): 2007-present
ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006-present
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2001-present, 2005-present (chair)
IEEE Global Internet (GI) Symposium: 2005-present
IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2005-present

Conference/Workshop Chair

ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006 (co-chair)
IEEE International Conference on Network Protocols (ICNP): 2003 (co-chair), 2006
International Workshop on Wireless Network Measurements (WiNMee): 2006 (co-chair)
IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2002 (co-chair)
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2002 (co-chair), 2003 (co-chair)
IEEE Global Internet (GI) Symposium: 2001 (co-chair)
International Workshop on Networked Group Communication (NGC): 2000 (co-chair)

Program Chair

IEEE International Conference on Network Protocols (ICNP): 2008 (co-chair)
IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON): 2007 (co-chair)
IFIP Networking: 2005 (co-chair)

Publicity Chair

IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2004 (co-chair)

Keynote Chair

IEEE Infocom: 2005 (co-chair)

Local Arrangements Chair

Internet2 "Field of Dreams" Workshop: 2000

Technical Program Committee

IEEE International Conference on Network Protocols (ICNP): 1999, 2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008, 2009 (Area Chair)
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009
IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON): 2004, 2005, 2006, 2007, 2008, 2009
IEEE Infocom: 2004, 2005, 2006, 2008, 2009
ACM International Conference on Next Generation Communication (CoNEXT): 2005, 2006, 2007, 2009
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM): 2005, 2006, 2007, 2008, 2009
ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006, 2008, 2009
IEEE International Conference on Broadband Communications, Networks, and Systems (BroadNets) Wireless Communications, Networks and Systems Symposium: 2007, 2008, 2009
IEEE International Conference on Broadband Communications, Networks, and Systems (BroadNets) Internet Technologies Symposium: 2007, 2008, 2009
IEEE International Conference on Computer Communication and Networks (IC3N): 2008, 2009
International Workshop on Mobile and Networking Technologies for Social Applications (MONET): 2008, 2009
Extreme Workshop on Communication-The Midnight Sun Expedition (ExtremeCom): 2009
Workshop on Scenarios for Network Evaluation Studies (SCENES): 2009
IEEE International Workshop on Cooperation in Pervasive Environments (CoPE): 2009
International Conference on Communication Systems and Networks (COMSNETS): 2009
International Workshop on the Network of the Future (FutureNet): 2009
SPIE Conference on Multimedia Computing and Networking (MMCN): 2004, 2008
ACM Multimedia (MM): 2001, 2003, 2004, 2005 (short paper), 2006, 2007, 2008, 2008 (short paper)
International Workshop on Wireless Network Measurements (WiNMee): 2006, 2008
ACM Sigcomm: 2008 (poster)
ACM Sigcomm Workshop on the Economics of Networks, Systems, and Computation (NetEcon): 2008
IEEE International Conference on Communications (ICC): 2008
IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS): 2008
IFIP/IEEE International Symposium on Integrated Network Management (IM): 2005, 2007
Global Internet (GI) Symposium: 2001, 2002, 2004, 2006, 2007
IFIP Networking: 2004, 2005, 2006, 2007
International Conference on Next Generation Communication (CoNEXT): 2005, 2006, 2007
IEEE/ACM International Conference on High Performance Computing (HiPC): 2007
ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc): 2007
IEEE Workshop on Embedded Systems for Real-Time Multimedia (ESTIMedia): 2007
IEEE/IFIP Wireless On Demand Network Systems and Services (WONS): 2007
IFIP/IEEE International Conference on Management of Multimedia Networks and

Services (MMNS): 2001, 2002, 2003, 2004, 2005, 2006
IASTED International Conference on European Internet and Multimedia Systems and Applications (EuroIMSA): 2004, 2006
IEEE/IFIP Network Operations and Management Symposium (NOMS): 2004, 2006
IEEE International Conference on Parallel and Distributed Systems (ICPADS): 2005, 2006
IEEE International Conference on Distributed Computing Systems (ICDCS): 2006
IEEE Globecom Internet Services and Enabling Technologies (IS&ET) Symposium: 2006
International Workshop on Incentive-Based Computing (IBC): 2006
IEEE International Workshop on Quality of Service (IWQoS): 2006
International Workshop on Multi-hop Ad Hoc Networks (REALMAN): 2006
IEEE Globecom Automatic Internet Symposium: 2005
ACM Sigcomm Workshop on the Economics of Peer-to-Peer Systems (P2PEcon): 2005
International Conference on Parallel Processing (ICPP): 2001, 2003, 2004
International Packet Video (PV) Workshop: 2002, 2003, 2004
IEEE International Symposium on High-Performance Distributed Computing (HPDC): 2004
ACM Sigcomm: 2004 (poster)
International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWIM): 2004
International Symposium on Innovation in Information & Communication Technology (ISIICT): 2004
Workshop on Coordinated Quality of Service in Distributed Systems (COQODS): 2004
IASTED International Conference on Networks and Communication Systems (NCS): 2004
IASTED International Conference on Communications, Internet, and Information Technology (CIIT): 2004
IASTED International Conference on Internet and Multimedia Systems and Applications (IMSA): 2003, 2004
International Workshop on Networked Group Communication (NGC): 1999, 2000, 2001, 2002, 2003
International Association for Development of the Information Society (IADIS) International Conference on the WWW/Internet: 2003
International Conference on Computer and Information Science (ICIS): 2003
Human.Society@Internet: 2003
IASTED International Conference on Communications and Computer Networks (CCN): 2002
The Content Delivery Networks (CDN) Event: 2001
IP Multicast Initiative Summit: 1998, 1999, 2000
Corporation for Education Network Initiatives in California (CENIC): 1999
Internet Bandwidth Management Summit (iBAND): 1998, 1999

Tutorial Chair

ACM Multimedia: 2000
IEEE International Conference on Network Protocols (ICNP): 1999

Panel/Session Organizer

NSF ANIR PI 2003 Panel on "Core Networking Issues and Protocols for the Internet"

CCW 2001 Session on "Multicast/Peer-to-Peer Networking"
NOSSDAV 2001 Panel on "Multimedia After a Decade of Research"
NGC 2000 Panel on "Multicast Pricing"

B. Technical Activities

1. Working Groups

IEEE Communications Society Internet Technical Committee (ITC), Conference Coordinator: 2000-2004
Internet2 Working Group on Multicast, Chair: 1998-2005
IETF Multicast Directorate (MADDOGS), Member: 1999-2001
IASTED Technical Committee on the Web, Internet and Multimedia, Member: 2002-2005
Internet Engineering Task Force (IETF), various working groups: 1995-present

2. Meeting Support Work

Internet Engineering Task Force MBone broadcasts: 1995-2005
Conference MBone broadcasts: Sigcomm '99, and '00
Interop+Networld Network Operations Center (NOC) Team Member: 1995-1997
ACM Multimedia technical staff: 1994

C. University of California Committees

1. Department of Computer Science Committees

Undergraduate Advising and Affairs: 2006-2007
Public Relations: 2005-2006 (chair 2005-2006)
Strategic Planning: 2000-2002, 2003-2006
Vice Chair: 2000-2005
Graduate Admissions: 2000-2005 (chair 2000-2005)
Graduate Affairs: 2000-2005 (co-chair 2000-2005)
Teaching Administration: 2000-2005
Facilities Committee: 1997-2001 (chair 1999-2000), 2006-2007
External Relations: 1999-2002
Computer Engineering Administration/Recruiting Committee: 1998-2001
Computer Engineering Lab and Computer Support Committee: 1998-2001
Faculty Recruiting Committee: 1999-2002
Graduate Advising: 1998-1999, 2000-2005

2. University Committees

Member, ISBER Advisory Committee: 2008-2009
Member, Campus Classroom Design and Renovation Committee: 2003-present
Faculty, Technology Management Program (TMP): 2003-present
Associate Director, Center for Information Technology and Society (CITS): 1999-present
Faculty, Cognitive Science Program: 2006-present
Faculty, Media Arts and Technology (MAT) Program: 1998-present

Faculty, Computer Engineering Degree Program: 1998-present
Member, Fulbright Campus Review Committee: 2007
Member, Faculty Outreach Grant Program Review Committee: 2007
Executive Vice Chancellor's Information Technology Fee Committee: 2005-2006
Council on Research and Instructional Resources: 2003-2006
Executive Vice Chancellor's Working Group on Graduate Diversity: 2004-2005
Member, Engineering Pavillion Planning Committee: 2003-2005
Information Technology Board: 2001-2004
Executive Committee, Center for Entrepreneurship & Engineering Management (CEEM): 2001-2004

3. System Wide Committees

UCSB Representative to the Committee on Information Technology and Telecommunications Policy (ITTP): 2003-2005
UCSB Representative to the Executive Committee, Digital Media Innovation (DiMI): 1998-2003

D. Georgia Tech Committees and Service (while a graduate student)

Graduate Student Body President: 1994-1995
Georgia Tech Executive Board: 1994-1995
Georgia Tech Alumni Association Executive Committee: 1994-1995
Dean of Students National Search Committee: 1995
Institute Strategic Planning Committee: 1994-1996